WHAT IS CLAIMED IS:

1. A lithium lanthanum zirconium oxide (LLZO) powder comprising:

LLZO particles;

wherein the LLZO particles have a D50 between 20 nm and 500nm, D10 of greater than or equal to D50÷4, and D90 less than or equal to D50×4;

wherein the LLZO particles have a sphericity factor of greater than 0.6, and

wherein a structure of the LLZO particles is a crystalline garnet structure and/or an amorphous structure.

2. The LLZO powder of Claim 1, wherein the D10 is equal to D50÷2.

3. The LLZO powder of any one of Claims 1-2, wherein the D90 is equal to D50×2.

4. The LLZO powder of any one of Claims 1-3, wherein the LLZO particles have a D50 between 50 nm and 500 nm.

5. The LLZO powder of any one of Claims 1-3, wherein the D50 is between 100 nm and 400 nm.

6. The LLZO powder of any one of Claims 1-3, wherein the D50 is between 150 nm to 300 nm.

7. The LLZO powder of any one of Claims 1-6, wherein the LLZO particles have a stoichiometry of $Li_{7-3x}M1_xLa_3Zr_2O_{12}$, M1 is Al, B, or Ga, and x is 0.1 to 0.3.

8. The LLZO powder of any one of Claims 1-6, wherein the LLZO particles have a stoichiometry of $Li_{7-y}La_3Zr_{2-y}M2_yO_{12}$, M2 is Ta or Nb, and y greater than or equal to 0.4.

9. The LLZO powder of any one of Claims 1-6, wherein the LLZO particles have a stoichiometry of $Li_{7-3nx}M1_xLa_3Zr_{2-my}M2_yO_{12}$, M1 is a low atomic mass metal, x is 0.1 to 0.3, and n can depend on the valence of M1.

10. The LLZO powder of any one of Claims 1-6, wherein the LLZO particles have a stoichiometry of $Li_{7-3nx}M1_xLa_3Zr_{2-my}M2_yO_{12}$, y greater than or equal to 0.4, and m can depend on the valence of M2.

11. The LLZO powder of any one of Claims 1-10, wherein the LLZO particles are crystalline.

12. The LLZO powder of Claim 11, wherein the crystalline structure of the LLZO particles is a garnet crystalline structure.

13. A solid state battery comprising:

an anode;

a cathode;

a solid electrolyte; and

a separator;

wherein either the anode, cathode or separator comprises LLZO particles;

wherein the LLZO particles have a D50 between 20 and 500nm, D10 of greater than or equal to D50÷4, and D90 less than or equal to D50×4;

wherein the LLZO particles have a sphericity factor of greater than 0.6, and

wherein a structure of the LLZO particles is a crystalline garnet structure.

14. The solid state battery of Claim 13, wherein the separator comprises the LLZO particles.

15. The solid state battery of Claim 14, wherein the separator is a composite or a ceramic non-composite separator.